

C L A I M S

[1] A nonaqueous electrolyte secondary battery which has a positive electrode containing lithium cobalt oxide as a positive active material, a negative electrode containing a graphite material and a nonaqueous electrolyte solution containing ethylene carbonate as a solvent and which is charged with an end-of-charge voltage of at least 4.3 V, said battery being characterized in that a zirconium-containing compound adheres onto particle surfaces of said lithium cobalt oxide.

[2] A nonaqueous electrolyte secondary battery which has a positive electrode containing lithium cobalt oxide as a positive active material, a negative electrode containing a graphite material and a nonaqueous electrolyte solution containing ethylene carbonate as a solvent and which is charged with an end-of-charge voltage of at least 4.3 V, said battery being characterized in that said positive active material is a product obtained by firing a mixture of a lithium salt, tricobalt tetraoxide (Co_3O_4) and a zirconium compound, and the zirconium compound adheres onto particle surfaces of said lithium cobalt oxide.

[3] The nonaqueous electrolyte secondary battery as recited in claim 2, characterized in that firing of said mixture is performed at a temperature of below 900 °C but not below 700 °C.

[4] The nonaqueous electrolyte secondary battery as recited

in claim 2 or 3, characterized in that a ratio in charge capacity of said negative electrode to said positive electrode (negative electrode/positive electrode) in their portions opposed to each other is in the range of 1.0 - 1.2, when said end-of-charge voltage
5 of the battery is prescribed at 4.4 V.

[5] The nonaqueous electrolyte secondary battery as recited in any one of claims 2 - 4, characterized in that said solvent in the nonaqueous electrolyte solution contains 10 - 20 % by volume of ethylene carbonate.

10 [6] The nonaqueous electrolyte secondary battery as recited in any one of claims 2 - 5, characterized in that zirconium is contained in said positive active material in the amount of less than 1 mole % but not less than 0.1 mole %, based on the total mole of cobalt and zirconium.

15 [7] The nonaqueous electrolyte secondary battery as recited in any one of claims 2 - 6, characterized in that said zirconium compound adhered onto a surface of said lithium cobalt oxide has a particle diameter from 100 nm to 3 μ m.

[8] A method for manufacturing a nonaqueous electrolyte
20 secondary battery which includes a positive electrode containing, as a positive active material, lithium cobalt oxide in the form of particles having a surface onto which a zirconium compound adheres, a negative electrode containing a graphite material and a nonaqueous electrolyte solution containing ethylene
25 carbonate as a solvent and which is charged with an end-of-charge

voltage of at least 4.3 V, characterized in that said positive active material is obtained by firing a mixture of a lithium salt, tricobalt tetraoxide (Co_3O_4) and a zirconium compound at a temperature of below 900 °C but not below 700 °C.

- 5 [9] The method for manufacturing a nonaqueous electrolyte secondary battery as recited in claim 8, characterized in that zirconium is contained in said positive active material in the amount of less than 1 mole % but not less than 0.1 mole %, based on the total mole of cobalt and zirconium.